

Distribution and dating of prehistoric earthquake liquefaction  
in the Wabash River Valley of the central U.S.

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### Background

Evidence of strong earthquake shaking in the lower Wabash Valley that was uncovered in 1990 suggested the occurrence there of at least one large ( $>6.2$ mb) earthquake sometime within the Holocene (Obermeier and others, 1991a). Geomorphological and pedological evidence argued that the features substantially predated the 1881-12 New Madrid earthquakes, and at one site a combination of radiometric and archaeologic dating bracketed at least one major earthquake event between 7500 and 1,500 yr BP. The paleoliquefaction sites lie within the Wabash Valley Seismic Zone, which has experienced numerous low magnitude earthquakes during the 200 years of historic record.

During July-August, 1991, a survey was conducted, by boat, of all eroding banks along the Wabash River, the main stem of the White River, and the lower portion of the East Fork of the White River, that is, covering 2x 300 km of riverbank. Fortunately low water levels presented the maximum possible depths of exposures, commonly bringing liquefaction source materials into view. Preliminary findings have been published in Munson and others (1991) and Obermeier and others (1991b).

### Results and interpretations to date

A total of 187 liquefaction features are now known from 24 sites. Features range from small dikes ( $<5$  cm) to large spreads (2.5 m). Actual blows, which were erupted onto paleosurfaces with and without distinct soil horizonation, are preserved buried beneath sequences of overbank silts and paleosols. Decreasing sizes from a single "core area" of very large dikes, the absence of any apparent crosscutting relationships, degree of weathering of dike inclusions, and consistent association of

dikes with only the earliest Holocene overbank deposits suggest that all sites resulted from a single, large earthquake centered somewhere in the vicinity of Vincennes, Indiana. Maximum age of the event can be determined from  $^{14}\text{C}$  dating of logs and leaf mats that frequently occur in sand and gravel point bar deposits that are the source material for the dike inclusions. Dikes penetrated and often vented upon surfaces of now buried paleosols. Archaeological sites with temporally diagnostic artifacts frequently occur in or upon overlying deposits, which provide minimum dates for the liquefaction features. In several instances archaeological hearth features containing carbonized wood occur on paleosurfaces upon which dikes vented and are thus penecontemporary with the dikes.

Many datable samples from source materials, from hearths at penetrated horizons and directly beneath blows presently await dating. Archaeological evidence and dates now available date this event at between 1,500 and 4,000 years ago.

#### References cited

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